MOURNING DOVE MANAGEMENT UNITS

A Progress Report

WEBER

UNITED STATES DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE

BUREAU OF SPORT FISHERIES AND WILDLIFE

Special Scientific Report--Wildlife No. 42

MOURNING DOVE MANAGEMENT UNITS

A Progress Report

by

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ABSTRACT

Tentative mourning dove management units for the United States are outlined on the basis of an analysis of bandings during the 1953-57 period. The three units -- Eastern, Central, and Western -- most nearly meet the criteria of an ideal management unit: a unit that produces the doves it harvests and does not produce doves that are harvested by other units. As an average for the three management units, 95 percent of a unit's hunting kill is produced inside the unit and 96 percent of a unit's harvested production is shot inside the unit or in Mexico and Central America. Hence the three units are practically independent of each other. These conclusions must be considered only tentative because they are based on insufficient band recoveries and on weighting procedures that need to be evaluated through further research.

INTRODUCTION

Management of the mourning dove (Zenaidura macroura) on a national and international scale is complicated. In such a large area as continental United States, this migratory game bird has widely varying characteristics of abundance and migratory movements. If this large heterogeneous area can be divided into smaller, more homogeneous units with mourning dove populations largely independent of each other, the management of these migratory birds will be placed on a better foundation.

To determine whether there are homogeneous units within the mourning dove population of continental United States, it is necessary to band representatives of the breeding population and to study their migratory movements. For this purpose, a cooperative mourning dove banding program has been under way throughout the United States for several years. Data from birds banded during the period 1953 through 1957 are the basis for this preliminary analysis with these objectives:

1. To relate production areas to harvest areas.

2. To outline management units composed of closely related production and harvest areas.

3. To determine comparative rates of harvest by hunters in the different management units.

Banding quotas designed to meet these objectives were established in 1955 and revised in 1958. Before this national program, mourning dove banding received a major contribution through the Southeastern Cooperative Dove Investigations, which began in 1948. In the national program, we hope to attain banding goals in 1960.

Mourning dove management units have been discussed in the Mourning Dove Newsletter since 1954. Peters (1956) discussed banding as a tool in mourning dove management and emphasized the importance of locally reared doves to the hunting kill of a State. Aldrich, Duvall, and Geis (1958) and Aldrich and Duvall (1958) used racial characteristics of mourning doves to relate areas of harvest to areas of production.

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The banding records which are the basis for this study were contributed by hundreds of independent, State, and Federal banders. Many of these individuals are continuing actively in mourning dove banding and are the backbone of any management program which is based on conclusions drawn from the analysis of banding data.

For background information and concepts of mourning dove management units presented in unpublished Mourning Dove Newsletters, I am indebted to W. F. Crissey, J. W. Aldrich, and H. S. Peters. For helpful suggestions in preparation of the manuscript, I extend my appreciation to E. L. Atwood, Lucille F. Stickel, J. W. Aldrich, and C. F. Kaczynski. I wish to thank A. J. Duvall and A. D. Geis for advice in tabulating banding records and for constructive criticism on procedures for weighting banding data.

PROCEDURE

Bandings and Recoveries

To reach the objective of relating production areas to harvest areas, it is necessary to use only banded birds that can be definitely associated with a breeding area. Although approximately 70,000 nestlings were banded during the 1953-57 period, the recovery rate was low, and the total number of first-season recoveries available for analysis is still inadequate in many respects. To increase the number of recoveries with which to work, other bandings were examined to determine the degree to which their recovery patterns were similar to the first-year or direct recoveries of nestlings. Statistical tests showed no significant difference between the migration patterns based on direct and indirect recoveries of nestlings banded any time of year and those based on recoveries of adults, immatures, and unknown-age doves banded during the months of May through August. Hence, the data from these bandings were combined for use in this preliminary report, which is based on 3,543 [1] recoveries from 113,978 banded mourning doves (tables 1 and 2).

1/ Tables are at the end of the report.

Weighting Factors

When banding effort is not proportionate to the size of the breeding population in the different States or regions, weighting factors are necessary to allow comparisons. For example, we used 39 band recoveries from doves banded in Massachusetts, a State with a relatively small breeding population, and 2 band recoveries from doves banded in Montana, an important dove-producing State. In order that band recoveries from the less important areas do not overshadow the recoveries from more important areas, it is necessary to weight the data prior to analysis. Weighting to eliminate disproportionate banding effort was accomplished by dividing the dove breeding-population index for a State by the number of doves banded (table 3). A State breeding-population index was estimated by multiplying the square miles of dove habitat in the State by a mean dove-density index that was based on data from call-count surveys conducted over a 4-year period, 1954-57.

In calculating band-recovery rates for local, immature, and adult mourning doves on a management-unit basis, the breeding-population index for a State was divided by the number of doves banded in each age group to obtain a weighting factor for each banded bird. Band-recovery rates on a State basis were calculated only for those States banding 100 or more doves in the age group of interest, and only those States were included in the calculation of weighted band-recovery rates for hunting and for non-hunting zones within a management unit (table 7).

To obtain an average band-recovery rate for a management unit having a hunting and a non-hunting zone, recovery rates for the two zones were weighted by the ratio of the breeding indexes of the zones (table 8).

Assumptions Underlying the Analysis

Emphasis in this report should be on the word preliminary, for the assumptions underlying the procedure of weighting mourning dove banding data are not well understood. In a general sense, three assumptions are necessary to validate this analysis: (1) Banded birds represent the breeding index of a State or management unit; (2) the breeding index represents the same proportion of the actual population in all management units; and (3) there is a uniform rate of reporting bands found on shot birds.

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Some of the shortcomings of the data available to fulfill these assumptions are as follows: (1) The distribution of banding does not always represent the distribution of the dove population; (2) unmeasured biases in the call-count census and possible variation in productivity between management units obscure the relation between the breeding index and the actual population (Southeastern Association, 1957); and (3) little is known of the variation in rate of reporting bands found on shot birds (Atwood and Geis, 1958).

It is clear that a real job lies ahead in eliminating or evaluating the biases that tend to invalidate the procedure followed.

MANAGEMENT UNITS AND BORDER STATES

Thirty States now class mourning doves as game birds and have open hunting seasons (figure 1). Several additional States are expanding their dove-research programs and are considering hunting seasons.

Figure 2 shows the tentative division of the United States into three management units. Within each of these units--Eastern, Central, and Western--production and harvest areas appear to be more closely related to each other than to production or harvest areas in another unit. These units most nearly meet the criteria of an ideal management unit: A unit that produces the doves it harvests and does not produce doves that are harvested by other units.

Border States between the Eastern and Central units are Wisconsin, Illinois, Missouri, Arkansas, and Louisiana. Figure 2 illustrates where birds banded in these States are shot and where the hunting kill of these border States originates. In these calculations, the five border States are considered neutral with respect to their assignment to either the Eastern or the Central management unit. For example, Wisconsin, a non-hunting State, contributed 54 percent of its banded doves to the harvest in the Eastern unit and 21 percent to that in the Central unit, on the basis of 24 band recoveries. The remaining 25 percent was shot in the border States or in Mexico or Central America. Recoveries of doves banded in Illinois, a hunting State, were distributed as follows: 35 percent to the Eastern unit, 6 percent to the Central unit, and 59 percent to the border States, Mexico, and Central America. Of the Illinois hunting kill, 5 percent (on the basis of weighted band recoveries) originated in the Eastern unit, outside the border States. Hence, Wisconsin and Illinois appear to fall rather definitely into the Eastern unit.
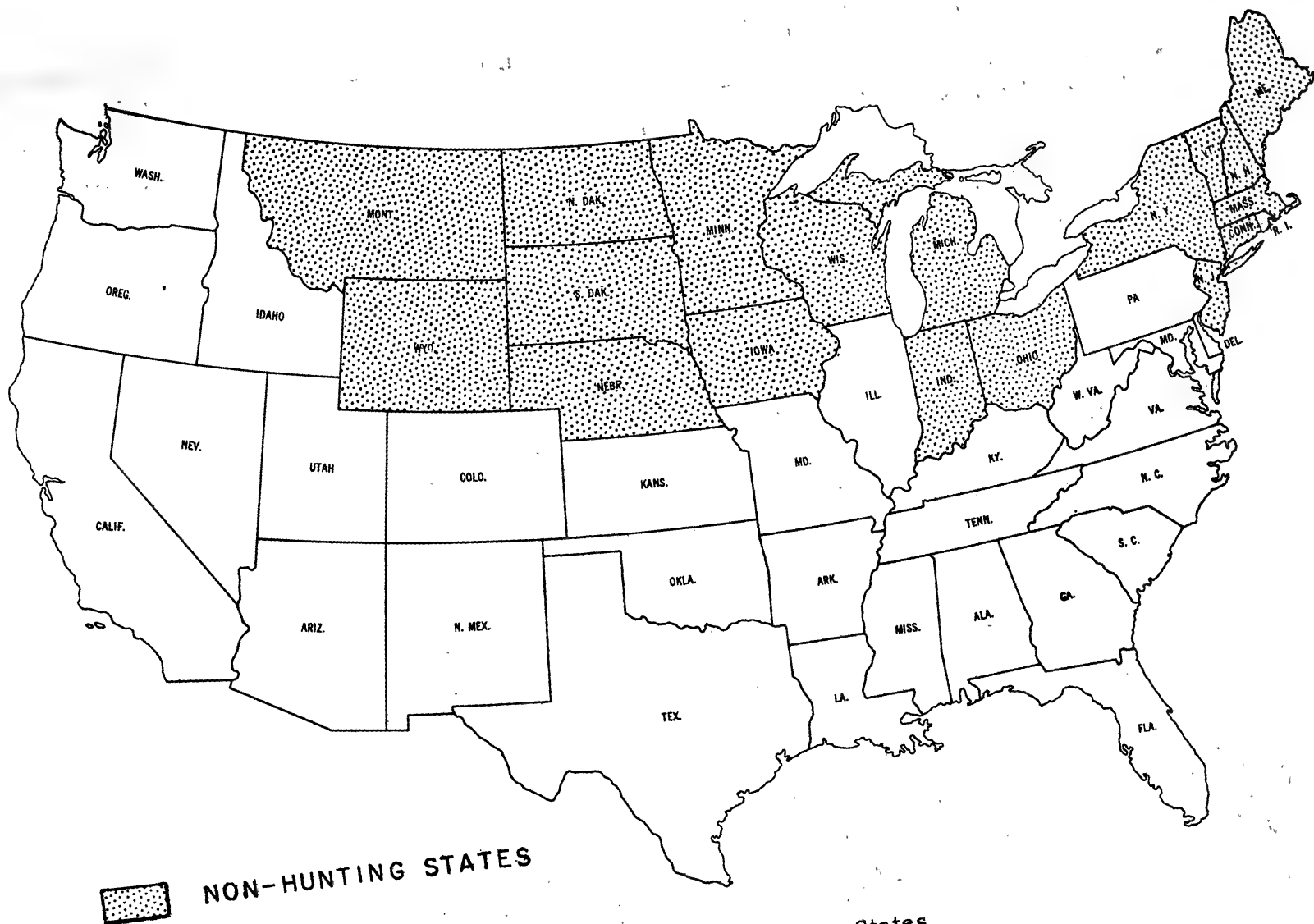
NON-HUNTING STATES

Figure 1. Non-hunting States
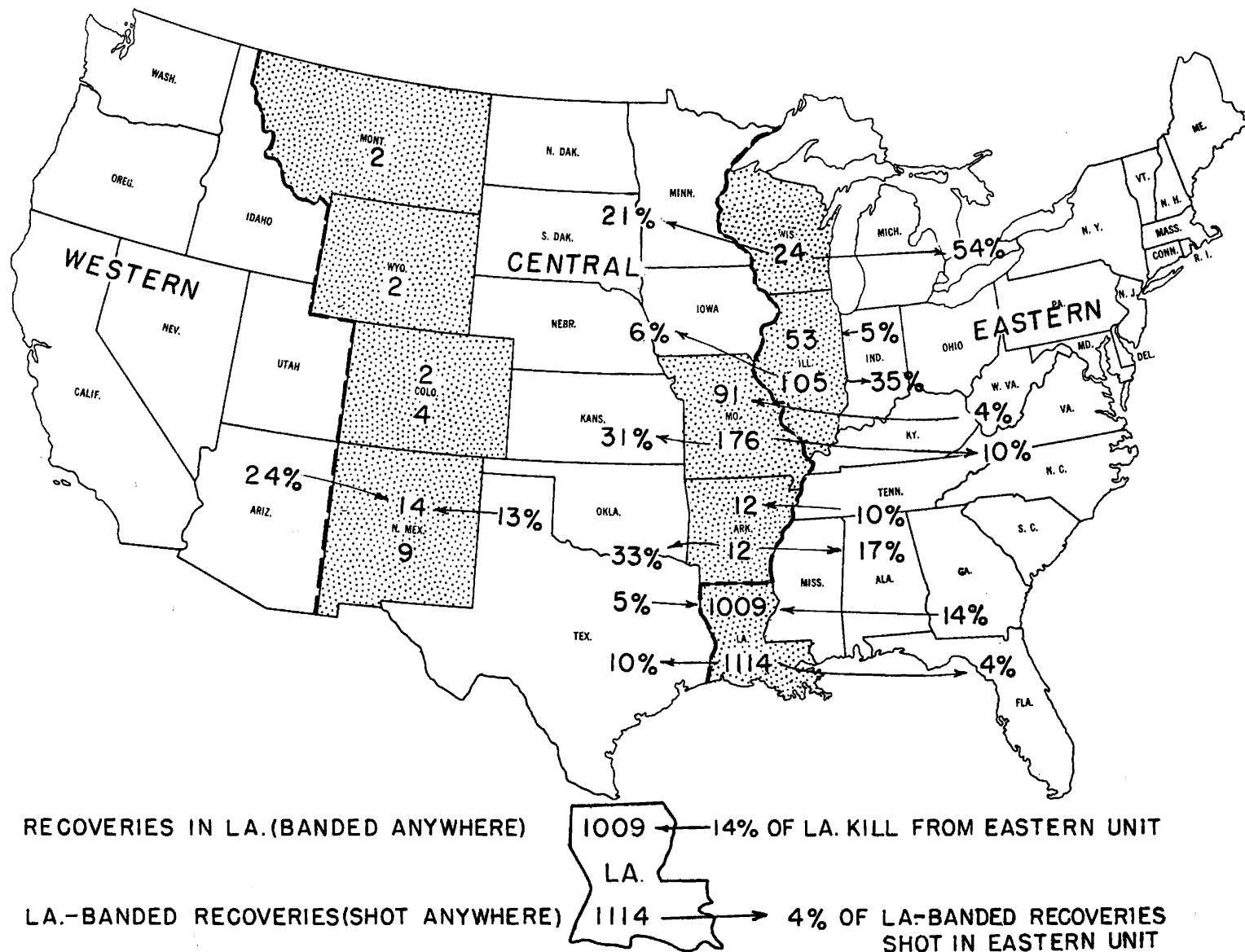
Figure 2. Border States--Origin of Hunting Kill and Contribution of Production to the Hunting Kill

The border States of Missouri, Arkansas, and Louisiana derive a higher percentage of their hunting kill from the Eastern unit than from the Central unit, but contribute more of their production to the kill in the Central unit. To illustrate; Louisiana derives 14 percent of its hunting kill from the Eastern unit and 5 percent from the Central unit. On the other hand, Louisiana contributes 4 percent of its harvested production to the hunting kill of the Eastern unit and 10 percent to the Central unit.

Since the border States of Missouri, Arkansas, and Louisiana have production and harvest affinities to both the Eastern and the Central management units, it was necessary to evaluate the effect on the independence of the Eastern and Central units when these States were shifted from one unit to the other (table 4). To meet the criteria of an ideal management unit, the percentage of the harvested production of a unit that is shot outside the unit of banding in the United States should be reduced to a minimum. Also, the percentage of the unit kill produced outside the unit should be minimal. These criteria are met best when Missouri and Arkansas are included in the Central unit and Louisiana in the Eastern unit. These conclusions are tentative.

Border States between the Central and Western units are Montana, Wyoming, Colorado, and New Mexico. Band recoveries were insufficient to align these States definitely with one unit or the other.

CONTRIBUTION OF PRODUCTION TO THE HUNTING KILL

Table 5 shows where the doves produced in a State are shot. Data are grouped in three categories: (1) Shot in State of banding; (2) shot outside State of banding but within the management unit; and (3) shot outside the management unit. States such as Florida, Texas, Arizona, and California each take 90 to 100 percent of their harvested production within the State of banding. These same States, however, receive 16 to 69 percent of their total hunting kill from doves produced outside the State (table 6).

The data of table 5, grouped according to management units, are shown in figure 3. Only a small percentage of the harvested production of a unit was shot outside the management unit of banding but inside the United States: 5 percent for the Eastern unit, 6 percent for the Central unit, and 1 percent for the Western unit. As an average for the three management units, 96 percent of a unit's harvested production was shot inside the unit or in Mexico and Central America.

Figure 3 also shows the relative size of each unit's contribution of production to the hunting kill. The Eastern unit produces doves which make up 29 percent of the total hunting kill of doves produced in the United States; comparable percentages for the Central and Western units are 44 percent and 27 percent.

ORIGIN OF HUNTING KILL

Origin of the hunting kill on a State and management-unit basis is shown in table 6 and figure 4. States such as Kentucky, Tennessee, Missouri, and Oregon each produce within the State 89 to 100 percent of their hunting kill. These States, however, are harvesting within the State only 49 to 84 percent of the total harvested production of the State (table 5).

The pie diagrams in figure 4 emphasize the high percentage of the hunting kill that is composed of birds banded and shot in the same State. Contributions to the hunting kill by birds banded outside the units where they were shot were small: 6 percent of the Eastern unit kill, 5 percent of the Central, and 4 percent of the Western. As an average for the three management units, 95 percent of a unit's hunting kill was produced inside the unit.

Of the total hunting kill of doves produced in the United States, 30 percent was made in the Eastern unit, 33 percent in the Central unit, 25 percent in the Western unit, and 12 percent in Mexico and Central America. The 12 percent shot in Mexico and Central America was divided as follows: 18 percent from the Western unit, 81 percent from the Central, and 1 percent from the Eastern unit.

BAND RECOVERY RATES

Band recovery rates are shown in table 7, grouped according to hunting or non-hunting zones of the management units. Recovery rates in hunting States generally are more than twice as high as recovery rates in the non-hunting States. The variation in recovery rates is considerable between States within a management unit and hunting zone. Further study of banding records and an evaluation of band-reporting rates in various States is needed.

Weighted band-recovery rates on a management-unit basis show that the Central unit recovery rate generally is lowest and the Eastern highest (table 8). If the assumptions of representative banding and a uniform band-reporting rate are valid, it must be concluded that hunting pressure is considerably greater in the Eastern unit than in the Central and that the Western unit is in an intermediate position.
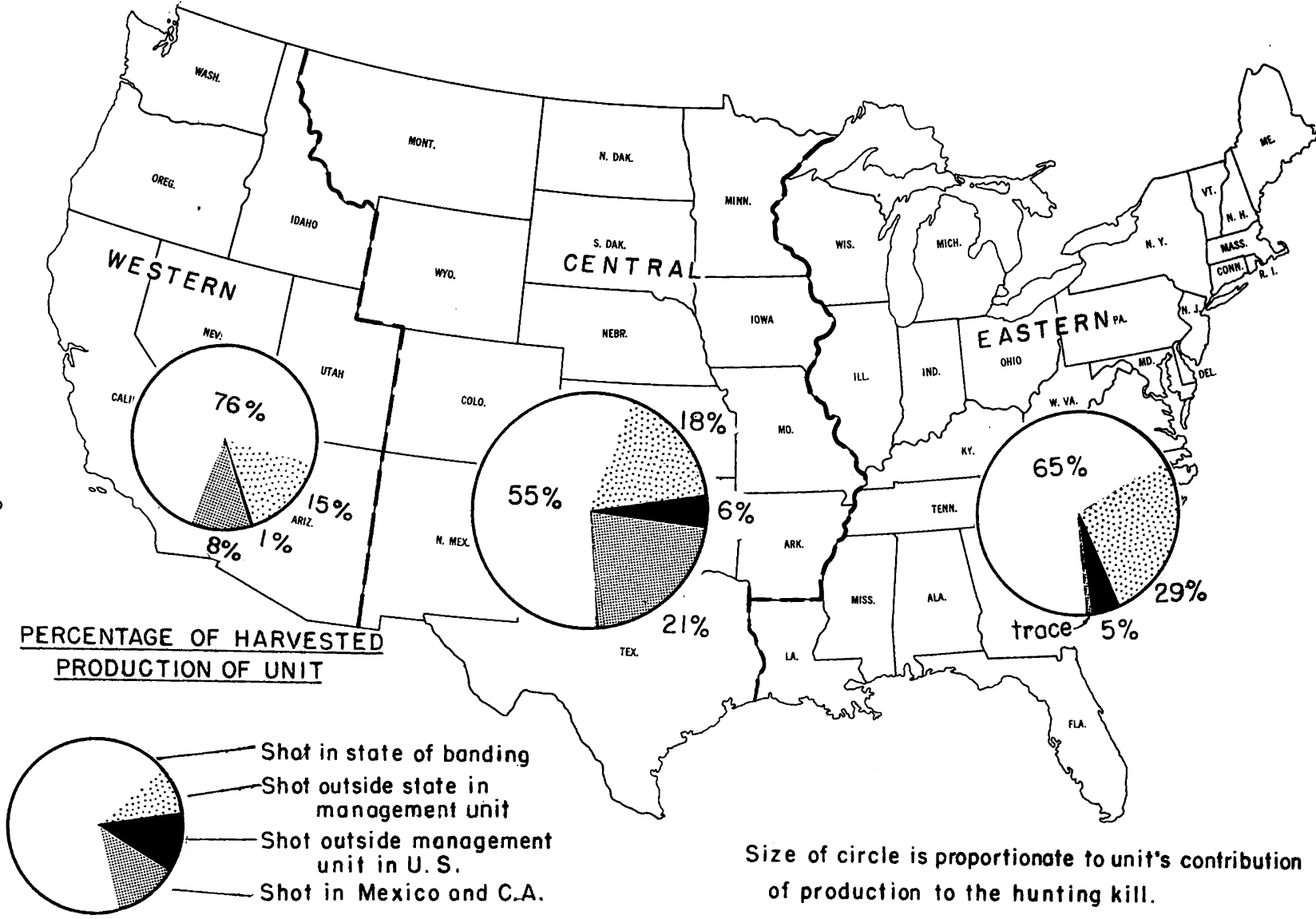
Figure 3. Contribution of Production by Management Units to the Hunting Kill

WESTERN
80%
4% 16%

CENTRAL
72%
5% 23%

EASTERN
65%
6% 29%

PERCENTAGE OF UNIT KILL

— Banded and shot in same state

— Banded in unit outside state
    of recovery

— Banded outside unit

Central 81%
East 1%   West 18%

MEXICO AND
CENTRAL AMERICA

Size of circle is
proportionate to
hunting kill
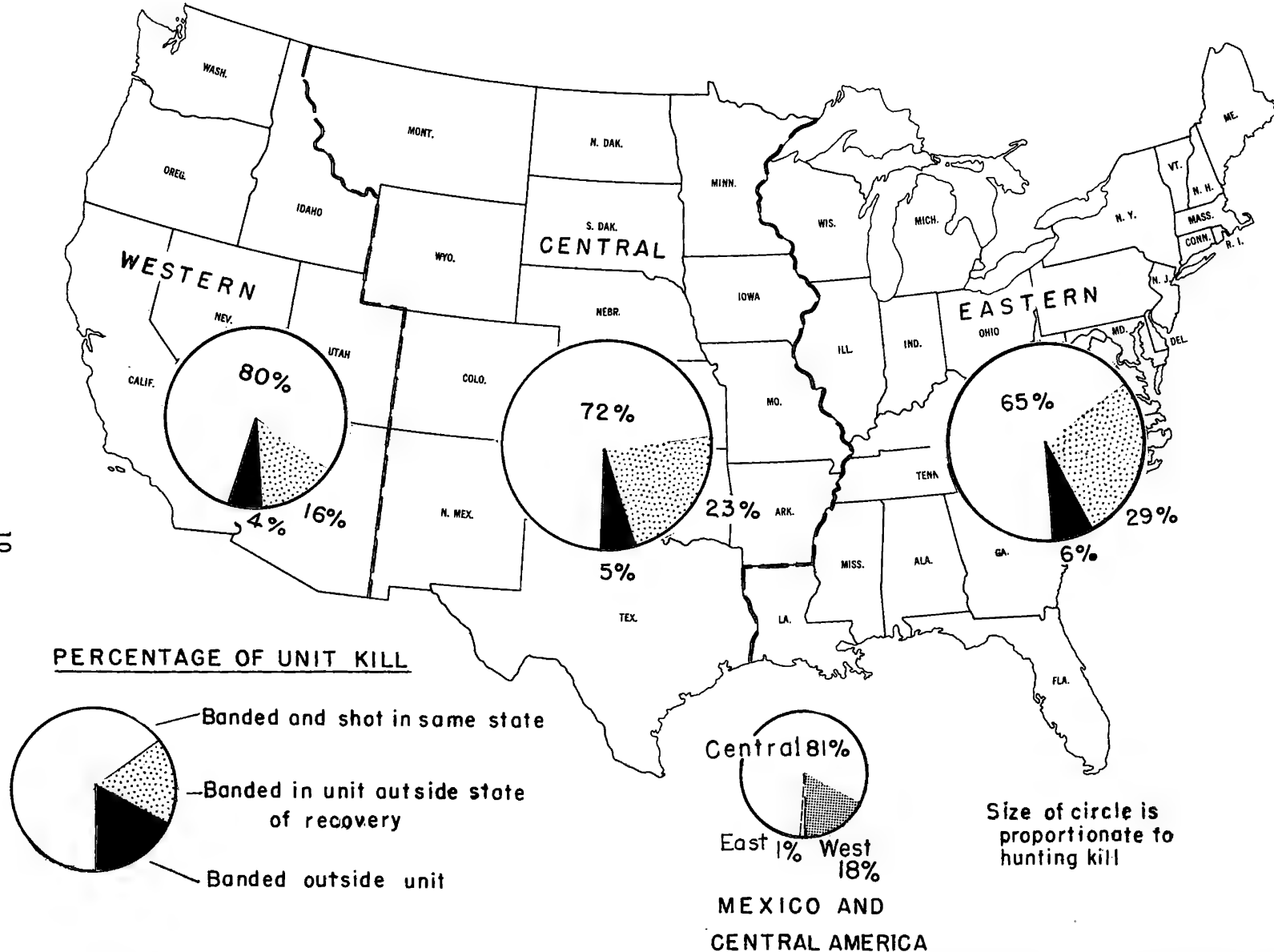
Figure 4. Origin of Hunting Kill

Band-recovery rates will be altered, probably slightly, when all recoveries from bandings used in this analysis are received. In general, banding in the Western and Central units was concentrated later in the time period of reference (1953-57) than was banding in the Eastern unit. Therefore, a greater number of additional recoveries, unavailable for this analysis, should be expected from the Western and Central units. The result for these two units will be a higher band-recovery rate, a higher percentage of the total hunting kill, and a larger contribution of production to the hunting kill. Such discrepancy in time of banding and opportunity for band recoveries could be overcome by using only first-hunting-season recoveries. At present, however, inadequate numbers of band recoveries in many States limit the value of restricting the analysis to first-hunting-season recoveries.

Continuing analysis of banding records, with emphasis on mortality studies, perhaps will shed more light on the question of the importance of hunting as a factor in mortality of mourning doves. A national survey of dove hunting kill is a critical need in dove management.

RESEARCH NEEDS

To make a banding analysis of this type more meaningful, we need (1) studies to evaluate and improve the breeding-population census and to determine productivity rates; (2) more representative banding in problem areas, particularly in border States of management units; and (3) an evaluation of the uniformity and rate of reporting bands. When these needs have been fulfilled, the organization of management units will be on a firmer foundation.

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Table 1. Mourning Dove Recoveries Used in the Analysis

Banded 1953-57. Recoveries through 1957-58 hunting season of shot birds only. Direct and indirect recoveries of adults and immatures banded May-August and locals banded any time of year.

Recovered in

Banded in	Ala.	Ariz.	Ark.	Calif.	Colo.	Dela.	Fla.	Ga.	Idaho	Ill.	Kans.	Ky.	La.	Md.	Miss.	Mo.	Nev.	N.Mex.	N.C.	Okla.	Oreg.	Pa.	S.C.	Tenn.	Texas	Utah	Va.	Wash.	C.A.	Mex.	Total	Banded in
Ala.	59						4	2					5																		70	Ala.
Ariz.		358		4														1							2					8	373	Ariz.
Ark.	1		3				1						2			1									4						12	Ark.
Calif.		3		192					1																					9	205	Calif.
Colo.		2			1																									1	4	Colo.
Conn.							2	1																							3	Conn.
Dela.						3									1																4	Dela.
Fla.							121																								121	Fla.
Ga.								3																							3	Ga.
Idaho		2		3					8								2							1						6	22	Idaho
Ill.	12						19	2		48	1		12		2	2									6				1		105	Ill.
Ind.	4						5	3		1	1		3												1	1					19	Ind.
Iowa	1						4				2	1							1						10					8	27	Iowa
Kans.											10									4					8					8	30	Kans.
Ky.	8						10	6				118	4		2	1		2					1	5	1	1					159	Ky.
La.	9		5				10	3		1			934		19	1		1						1	116				2	11	1,114	La.
Md.							1						2					1				1									5	Md.
Mass.	3					1	9	8										7			1	8			1	1					39	Mass.
Mich.	5						4	4					3											1	1						18	Mich.
Minn.	1												1				1								6				2		11	Minn.
Miss.	6		2				12	3					14		99								1		8				1	1	147	Miss.
Mo.	5						4	2			2	2	7		1	85			4				1	2	49				2	9	176	Mo.
Mont.																													2		2	Mont.
Nebr.											1		1							1					16					19	38	Nebr.
Nev.									1																						1	Nev.
N.J.		1					1	1								2			1												6	N.J.
N.Mex.																		6											1	2	9	N.Mex.
N.Y.	1						2						1						1												5	N.Y.
N.C.	1						1	1											12												14	N.C.
N.Dak.	1				1		1	1					1							1					23				4	17	51	N.D.
Ohio	8		1				16	7		1		8		1	2								4	1	2	1					52	Ohio
Okla.	1																			8					14					1	24	Okla.
Oreg.		4		17														2	1		53							6		9	92	Oreg.
Pa.	2						5	5					1					4				23	3								43	Pa.
R.I.							1																								1	R.I.
S.C.							1																10								11	S.C.
S.Dak.			1								1														13				1	11	27	S.Dak.
Tenn.	1						1						2			1								26							31	Tenn.
Texas	1												3					2		3					366				2	31	408	Texas
Utah		1		1																							2			1	5	Utah
Va.																							1								1	Va.
Wash.				6												1												19		3	29	Wash.
Wis.	2						6	2		1	1		5		2										4					1	24	Wis.
Wyo.																									1					1	2	Wyo.
Total	130	371	12	223	2	4	238	58	10	53	18	123	1007	7	127	91	4	14	30	21	53	24	31	36	651	3	4	25	16	158	3,543	Total

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Table 2. Mourning Dove Bandings Used in this Analysis.
Banded 1953-1957. Included are locals banded any time of year
and other ages banded only during May, June, July, and August.

State	Adult	Immature	Unknown	Local	Total
Ala.	351	200	26	818	1,395
Ariz.	4,285	4,292	457	135	9,169
Ark.	28	8	124	432	592
Calif.	1,031	986	287	5,324	7,628
Colo.	121	52	34	164	371
Conn.	70	17	77	2	166
Del.	4	--	6	107	117
D. C.	4	--	--	--	4
Fla.	202	3,711	8	32	3,953
Ga.	71	20	44	40	175
Idaho	209	385	4	112	710
Ill.	11	95	24	4,738	4,868
Ind.	190	55	31	2,259	2,535
Iowa	15	--	380	2,789	3,184
Kan.	36	145	2	1,693	1,876
Ky.	435	138	74	2,517	3,164
La.	6,094	6,575	357	751	13,777
Md.	21	13	9	44	87
Mass.	521	360	47	548	1,476
Mich.	162	34	23	812	1,031
Minn.	71	19	58	2,893	3,041
Miss.	305	165	43	4,132	4,645
Mo.	2,483	793	218	2,917	6,411
Mont.	1	--	--	103	104
Neb.	46	67	16	4,454	4,583
Nev.	17	10	176	--	203
N. J.	316	63	32	22	433
N. Mex.	473	463	3	464	1,403
N. Y.	152	38	30	53	273
N. Car.	94	42	--	70	206
N. Dak.	106	123	235	5,708	6,172
Ohio	415	270	21	3,319	4,025
Okla.	44	24	56	790	914
Ore.	2,337	656	212	270	3,475
Pa.	375	95	75	332	877
R. I.	21	10	1	22	54
S. Car.	103	113	1	184	401
S. Dak.	12	8	4	4,164	4,188
Tenn.	51	14	21	560	646
Texas	49	160	53	12,403	12,665
Utah	12	1	--	476	489
Va.	29	4	21	11	65
Wash.	12	6	--	780	798
W. Va.	--	--	--	64	64
Wisc.	58	79	17	628	782
Wyo.	1	--	--	782	783
Total	21,444	20,309	3,307	68,918	113,978

Table 3. Factors for Weighting Banding Data.

State	Average Calls Per Route * (1)	Est. Dove Habitat (sq. mi.) (2)	Dove Index (1,000's) (1) X (2)	Doves Banded	Band Weight
Ala.	20.0**	51,078	1,022	1,395	733
Ariz.	37.0	113,580	4,202	9,169	459
Ark.	28.0	52,725	1,476	592	2,493
Calif.	33.6	141,123	4,742	7,628	622
Colo.	41.5	72,777	3,020	371	8,140
Conn.	7.3	3,919	29	166	175
Del.	30.8	1,978	61	117	521
D. C.	No index			4	
Fla.	15.3	54,262	830	3,953	210
Ga.	19.4**	58,518	1,135	175	6,486
Idaho	30.4	49,685	1,510	710	2,127
Ill.	23.3	55,947	1,304	4,868	268
Ind.	36.7	36,205	1,332	2,535	525
Iowa	45.8	55,986	2,564	3,184	805
Kans.	40.0	92,113	3,684	1,876	1,964
Ky.	20.1**	40,109	806	3,164	255
La.	24.0	45,177	1,084	13,777	79
Md.	20.6	9,393	193	87	2,218
Mass.	4.3	1,977	8	1,476	5
Mich.	23.2	28,511	661	1,031	641
Minn.	35.2	60,007	2,112	3,041	695
Miss.	23.8**	47,420	1,128	4,645	243
Mo.	47.8	69,270	3,311	6,411	516
Mont.	28.4	124,369	3,532	104	33,962
Nebr.	50.0	76,653	3,833	4,583	836
Nev.	28.2	108,704	3,065	203	15,099
N. J.	12.7	7,522	96	433	222
N. Mex.	31.1	109,360	3,401	1,403	2,424
N. Y.	27.9	11,982	334	273	1,223
N. C.	24.5**	44,232	1,084	206	5,262
N. Dak.	19.5	70,054	1,366	6,172	221
Ohio	20.7	41,122	851	4,025	211
Okla.	26.9	69,283	1,863	914	2,038
Oreg.	31.3	72,263	2,261	3,475	651
Pa.	11.0	23,465	258	877	294
R. I.	No index			54	
S. C.	25.5**	30,594	780	401	1,945
S. Dak.	61.0	73,475	4,482	4,188	1,070
Tenn.	28.7**	41,961	1,204	646	1,864
Texas	46.2	263,644	12,180	12,665	962
Utah	37.0	74,111	2,742	489	5,607
Va.	21.9	37,904	830	65	12,769
Wash.	43.0	46,884	2,016	798	2,526
W. Va.	10.3	16,863	174	64	2,718
Wis.	42.0	38,300	1,609	782	2,058
Wyo.	13.9	82,080	1,141	783	1,457
Total		2,606,585	85,316	113,978	

* Average data from 1954-1957
** Average of 1957 random call-count routes only

Table 4. Changes in Independence of Management Units when Missouri, Arkansas, and Louisiana are shifted between the Eastern and Central Units.

Management Units	Percentage of Harvested Production of Unit			Percentage of Unit Kill	
	Shot in unit of banding	Shot outside unit of banding in U. S.	Shot in Mexico and C. A.	Produced in unit	Produced outside unit
EASTERN					
Mo.-Ark.-La. in Eastern	90	9	1	98	2
Mo.-Ark.-La. in Central	90	10	T	94	6
Mo.-Ark. in Central	95	5	T	94	6
CENTRAL					
Mo.-Ark.-La. in Eastern	72	4	24	88	12
Mo.-Ark.-La. in Central	76	5	19	93	7
Mo.-Ark. in Central	73	6	21	95	5
WESTERN					
Not affected by Mo.-Ark.-La.	91	1	8	96	4

Table 5. Contribution of Production by States to the Hunting Kill

EASTERN MANAGEMENT UNIT - HUNTING STATES

State of Banding	Production Contribution -- Number Recoveries	Total Index	Shot in State of Banding Index	%	Shot Outside State in Mgt. Unit Index	%	Shot Outside* Mgt. Unit Index	%
Ala.	70	51,310	43,247	84	8,063	16	0	0
Del.	4	2,084	1,563	75	521	25	0	0
Fla.	121	25,410	25,410	100	0	0	0	0
Ga.	3	19,458	19,458	100	0	0	0	0
Ill.	105	28,140	12,864	46	12,864	46	2,144-C	7
							268-F	1
Ky.	159	40,545	30,090	74	9,945	25	510-C	1
La.	1,114	88,006	73,786	84	3,555	4	9,638-C	11
							1,027-F	1
Md.	5	11,090	4,436	40	6,654	60	0	0
Miss.	147	35,721	24,057	67	8,748	25	2,430-C	7
							486-F	1
N. C.	14	73,668	63,144	86	10,524	14	0	0
Pa.	43	12,642	6,762	54	5,880	46	0	0
R. I.	1	No index						
S. C.	11	21,395	19,450	91	1,945	9	0	0
Tenn.	31	57,784	48,464	84	7,456	13	1,864-C	3
Va.	1	12,769	0	0	12,769	100	0	0
W. Va.	0							
Subtotal	1,829	480,022	372,731	78	88,924	18	16,586-C	4
							1,781-F	T

EASTERN MANAGEMENT UNIT - NON-HUNTING STATES

State of Banding	Production Contribution -- Number Recoveries	Total Index	Shot in State of Banding Index	%	Shot Outside State in Mgt. Unit Index	%	Shot Outside* Mgt. Unit Index	%
Conn.	3	525	-	-	525	100	0	0
Ind.	19	9,975	-	-	9,450	95	525-C	5
Maine	0	No index						
Mass.	39	195	-	-	190	97	5-C	3
Mich.	18	11,538	-	-	11,538	100	0	0
N. H.	0	No index						
N. J.	6	1,332	-	-	1,110	83	222-C	17
N. Y.	5	6,115	-	-	6,115	100	0	0
Ohio.	52	10,972	-	-	10,339	94	633-C	6
Vt.	0	No index						
Wis.	24	49,392	-	-	39,102	79	10,290-C	21
Subtotal	166	90,044			78,369	87	11,675-C	13

State of Banding	Production Contribution -- Number Recoveries	Total Index	Shot in State of Banding Index	%	Shot Outside State in Mgt. Unit Index	%	Shot Outside* Mgt. Unit Index	%
Eastern Unit Total	1,995	570,066	372,731	65	167,293	29	28,261-C	5
							1,781-F	T

* C-Central Unit
F-Foreign

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Table 5. Contribution of Production by States to the Hunting Kill (Cont'd)

CENTRAL MANAGEMENT UNIT - HUNTING STATES

State of Banding	Production Contribution	--	Shot in State of Banding		Shot Outside State in Mgt. Unit		Shot Outside* Mgt. Unit	
	Number Recoveries	Total Index	Index	%	Index	%	Index	%
Ark.	12	29,916	7,479	25	12,465	42	9,972-E	33
Colo.	4	32,560	8,140	25	0	0	16,280-W	50
							8,140-F	25
Kans.	30	58,920	19,640	33	23,568	40	15,712-F	27
Mo.	176	90,816	43,860	49	28,380	31	12,900-E	14
							5,676-F	6
N. Mex	9	21,816	14,544	67	0	0	7,272-F	33
Okla.	24	48,912	16,304	34	28,532	58	2,038-E	4
							2,038-F	4
Texas	408	392,496	352,092	90	4,810	1	3,848-E	1
							31,746-F	8
Subtotal	663	675,436	462,059	68	97,755	15	28,758-E	4
							16,280-W	2
							70,584-F	11

CENTRAL MANAGEMENT UNIT - NON-HUNTING STATES

State of Banding	Number Recoveries	Total Index	Index	%	Index	%	Index	%
Iowa	27	21,735	-	-	10,465	48	4,830-E	22
							6,440-F	30
Minn.	11	7,645	-	-	4,865	64	1,390-E	18
							1,390-F	18
Mont.	2	67,924	-	-	0	0	67,924-F	100
Nebr.	38	31,768	-	-	15,048	47	836-E	3
							15,884-F	50
N. Dak.	51	11,271	-	-	5,746	51	884-E	8
							4,641-F	41
S. Dak.	27	28,890	-	-	14,980	52	1,070-W	4
							12,840-F	44
Wyo.	2	2,914	-	-	1,457	50	1,457-F	50
Subtotal	158	172,147			52,561	31	7,940-E	5
							1,070-W	T
							110,576-F	64
Central Unit Total	821	847,583	462,059	55	150,316	18	36,698-E	4
							17,350-W	2
							181,160-F	21

* E-Eastern
  W-Western
  F-Foreign

Table 5.   Contribution of Production by States to Hunting Kill (Cont'd)

WESTERN MANAGEMENT UNIT - HUNTING STATES

State of Banding	Production Contribution --		Shot in State of Banding		Shot Outside State in Mgt. Unit		Shot Outside* Mgt. Unit	
	Number Recoveries	Total Index	Index	%	Index	%	Index	%
Ariz.	373	171,207	164,322	96	1,836	1	1,377-C	1
							3,672-F	2
Calif.	205	127,510	119,424	94	2,488	2	5,598-F	4
Idaho	22	46,794	17,016	37	12,762	27	4,254-C	9
							12,762-F	27
Nev.	1	15,099	0	0	15,099	100	0	0
Oreg.	92	59,892	34,503	58	18,879	31	651-C	1
							5,859-F	10
Utah	5	28,035	11,214	40	11,214	40	5,607-F	20
Wash.	29	73,254	47,994	66	17,682	24	7,578-F	10
Western Unit Total	727	521,791	394,473	76	79,960	15	6,282-C	1
							41,076-F	8

* C-Central Unit
  F-Foreign

Table 6. Origin of Hunting Kill

EASTERN MANAGEMENT UNIT

State of Recovery	Origin of Kill -- Number Recoveries	Total Index	Banded in State Index	%	Banded in Unit Outside State Index	%	Banded Outside Unit* Index	%
Ala.	130	74,303	43,247	58	22,224	30	8,832-C	12
Del.	4	1,568	1,563	100	5	T	0	0
Fla.	238	80,614	25,410	31	47,206	59	7,998-C	10
Ga.	58	46,881	19,458	41	25,208	54	2,215-C	5
Ill.	53	16,253	12,864	79	2,873	18	516-C	3
Ky.	123	31,994	30,090	94	872	3	1,032-C	3
La.	1,007	118,628	73,786	62	30,801	26	14,041-C	12
Md.	7	6,835	4,436	65	2,399	35	0	0
Miss.	127	31,658	24,057	76	7,085	22	516-C	2
N. C.	30	70,665	63,144	89	7,521	11	0	0
Pa.	24	6,767	6,762	100	5	T	0	0
R. I.	0							
S. C.	31	37,694	19,450	52	17,728	47	516-C	1
Tenn.	36	51,866	48,464	93	2,370	5	1,032-C	2
Va.	4	996	0	0	996	100	0	0
W. Va.	0							
Total	1,872	576,722	372,731	65	167,293	29	36,698-C	6

CENTRAL MANAGEMENT UNIT

State of Recovery	Number Recoveries	Total Index	Banded in State Index	%	Banded in Unit Outside State Index	%	Banded Outside Unit* Index	%
Ark.	12	8,793	7,479	85	0	0	1,314-E	15
Colo.	2	8,361	8,140	97	221	3	0	0
Kans.	18	26,467	19,640	74	4,769	18	2,058-E	8
Mo.	91	49,087	43,860	89	2,493	5	2,734-E	6
N. Mex.	14	22,748	14,544	64	2,840	12	5,364-W	24
Okla.	21	30,751	16,304	53	14,447	47	0	0
Texas	651	500,711	352,092	70	125,546	25	22,155-E	5
							918-W	T
Total	809	646,918	462,059	72	150,316	23	28,261-E	4
							6,282-W	1

* C-Central Unit
  E-Eastern Unit
  W-Western Unit

Table 6. Origin of Hunting Kill (Cont'd)

WESTERN MANAGEMENT UNIT

State of Recovery	Origin of Kill -- Number Recoveries	Total Index	Banded in State Index	%	Banded in Unit Outside State Index	%	Banded Outside Unit* Index	%
Ariz.	371	196,003	164,322	84	14,331	7	17,350-C	9
Calif.	223	159,471	119,424	75	40,047	25	0	0
Idaho	10	32,737	17,016	52	15,721	48	0	0
Nev.	3	8,880	0	0	3,828	100	0	0
Oreg.	53	34,503	34,503	100	0	0	0	0
Utah	3	13,341	11,214	84	2,127	16	0	0
Wash.	25	51,900	47,994	92	3,906	8	0	0
Total	688	491,783	394,473	80	79,960	16	17,350-C	4

MEXICO and CENTRAL AMERICA

Country of Recovery	Origin of Kill -- Number Recoveries	Total Index	Banded in Eastern Unit Index	%	Banded in Central Unit Index	%	Banded in Western Unit Index	%
Mexico	158	214,624	1,112	1	172,436	80	41,076	19
Guatemala	10	4,946	158	3	4,788	97	0	0
Honduras	3	1,559	268	17	1,291	83	0	0
El Salvador	2	464	243	52	221	48	0	0
Costa Rica	1	2,424	0	0	2,424	100	0	0
Total	174	224,017	1,781	1	181,160	81	41,076	18

* C-Central Unit

Table 7.   Band-recovery Rates

Bandings are included for 1953 through 1957.   Recoveries include direct and indirect shot-in-hunting-season recoveries for the same period.

EASTERN MANAGEMENT UNIT - HUNTING STATES

State	Adults			Immatures			Locals		
	No. Banded	No. Recov.	% Recov.*	No. Banded	No. Recov.	% Recov.*	No. Banded	No. Recov.	% Recov.*
Ala.	351	14	4.0	200	16	8.0	818	40	4.9
Del.	4	0		0	0		107	4	3.7
Fla.	202	5	2.5	3,711	110	3.0	32	6	
Ga.	71	1		20	1		40	0	
Ill.	11	2		95	7		4,738	94	2.0
Ky.	435	19	4.4	138	4	2.9	2,517	130	5.2
La.	6,094	486	8.0	6,575	558	8.5	751	53	7.1
Md.	21	3		13	0		44	2	
Miss.	305	10	3.3	165	11	6.7	4,132	125	3.0
N. C.	94	1		42	3		70	10	
Pa.	375	13	3.5	95	7		332	22	6.6
R. I.	21	1		10	0		22	0	
S. C.	103	0	0.0	113	4	3.5	184	7	3.8
Tenn.	51	5		14	0		560	22	3.9
Va.	29	0		4	0		11	1	
W. Va.	0	0		0	0		64	0	
Total:	8,167	560	6.9	11,195	721	6.4	14,422	516	3.6
Weighted Percent:		3.9			5.7			4.2	

EASTERN MANAGEMENT UNIT - NON-HUNTING STATES

State	No. Banded	No. Recov.	% Recov.*	No. Banded	No. Recov.	% Recov.*	No. Banded	No. Recov.	% Recov.*
Conn.	70	3		17	0		2	0	
D. C.	4	0		0	0		0	0	
Ind.	190	1	0.5	55	2		2,259	15	0.7
Maine	0	0		0	0		0	0	
Mass.	521	7	1.3	360	14	3.9	548	17	3.1
Mich.	162	5	3.1	34	1		812	12	1.5
N. H.	0	0		0	0		0	0	
N. J.	316	5	1.6	63	1		22	0	
N. Y.	152	2	1.3	38	1		53	1	
Ohio	415	2	0.5	270	3	1.1	3,319	47	1.4
Vt.	0	0		0	0		0	0	
Wis.	58	2		79	3		628	18	2.9
Total:	1,888	27	1.4	916	25	2.7	7,643	110	1.4
Weighted Percent:		1.1			1.1			1.7	

*Band-recovery rates in percent are calculated for States banding 100 or more doves. The recovery rates for these States then are weighted on the basis of their breeding index to obtain weighted band-recovery rates for age groups within hunting and non-hunting zones of management units.

Table 7.   Band-recovery Rates (Cont'd)

CENTRAL MANAGEMENT UNIT - HUNTING STATES

State	Adults No. Banded	Adults No. Recov.	Adults % Recov.*	Immatures No. Banded	Immatures No. Recov.	Immatures % Recov.*	Locals No. Banded	Locals No. Recov.	Locals % Recov.*
Ark.	28	2		8	0		432	9	2.1
Colo.	121	1	0.8	52	2		164	1	0.6
Kans.	36	0		145	5	3.4	1,693	25	1.5
Mo.	2,483	73	2.9	793	13	1.6	2,917	82	2.8
N. Mex.	473	2	0.4	463	2	0.4	464	5	1.1
Okla.	44	4		24	5		790	14	1.8
Texas	49	0	___	160	5	3.1	12,403	399	3.2
Total:	3,234	82	2.5	1,645	32	1.9	18,863	535	2.8
Weighted Percent:			1.4			2.6			2.3

CENTRAL MANAGEMENT UNIT - NON-HUNTING STATES

State	Adults No. Banded	Adults No. Recov.	Adults % Recov.*	Immatures No. Banded	Immatures No. Recov.	Immatures % Recov.*	Locals No. Banded	Locals No. Recov.	Locals % Recov.*
Iowa	15	1		0	0		2,789	25	0.9
Minn.	71	1		19	0		2,893	10	0.3
Mont.	1	0		0	0		103	2	1.9
Nebr.	46	1		67	1		4,454	33	0.7
N. Dak.	106	2	1.9	123	1	0.8	5,708	47	0.8
S. Dak.	12	0		8	0		4,164	27	0.6
Wyo.	1	0	___	0	0	___	782	2	0.3
Total:	252	5	2.0	217	2	0.9	20,893	146	0.7
Weighted Percent:			1.9			0.8			0.9

WESTERN MANAGEMENT UNIT - HUNTING STATES

State	Adults No. Banded	Adults No. Recov.	Adults % Recov.*	Immatures No. Banded	Immatures No. Recov.	Immatures % Recov.*	Locals No. Banded	Locals No. Recov.	Locals % Recov.*
Ariz.	4,285	204	4.8	4,292	152	3.5	135	3	2.2
Calif.	1,031	17	1.6	986	22	2.2	5,324	155	2.9
Idaho	209	4	1.9	385	17	4.4	112	1	0.9
Nev.	17	0		10	0		0	0	
Oreg.	2,337	46	2.0	656	39	5.9	270	1	0.4
Utah	12	0		1	0		476	5	1.0
Wash.	12	2	___	6	0	___	780	27	3.5
Total:	7,903	273	3.5	6,336	230	3.6	7,097	192	2.7
Weighted Percent:			2.8			3.6			2.0

*Band-recovery rates in percent are calculated for States banding 100 or more doves. The recovery rates for these States then are weighted on the basis of their breeding index to obtain weighted band-recovery rates for age groups within hunting and non-hunting zones of management units.

Table 8. Comparative Weighted Band-recovery Rates
on a Management-unit Basis.

| | | Band-recovery Rate (Percent) | | |
		Adults	Immatures	Locals
Eastern Management Unit	Hunting States	3.9	5.7	4.2
	Non-hunting States	1.1	1.1	1.7
	Average*	3.1	4.4	3.5
Central Management Unit	Hunting States	1.4	2.6	2.3
	Non-hunting States	1.9	0.8	0.9
	Average*	1.6	1.9	1.7
Western Management Unit	Hunting States	2.8	3.6	2.0

*The averages are weighted on the basis of the breeding indexes of the hunting
and non-hunting zones of the management units.

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